the part occasioning it is further advanced on the sun's disk," thus the formation of *beads* is accounted for, and their elongation.

"Again, when the junction is broken, the same causes will account for the *widening* of the separation, and that in a *greater degree towards the sides* which are more remote from the circumference."

The author then proceeds to illustrate his explanation by means of diagrams applying to the different phases of the phenomenon; and he considers the principles laid down in explanation to possess the character of a "*vera causa*," though they may not suffice to explain all the phenomena.

Differences in the appearances of the beads as described by different observers must also be expected, both from the preceding theory, and from the circumstance that there are differences in the *power* and *aperture* of the *telescopes* employed; the author hopes shortly to be able to offer to the Society some contributions towards the better elucidation of this subject.

It is perhaps questionable whether the same principles will afford an explanation of certain apparently analogous phenomena observed in the transits of *Venus;* but, in general, the adherence of the planet to the limb of the sun by a neck at the point of junction, and the protuberance of the disk towards the same part of the separation, are appearances which agree sufficiently with the cause above assigned.

In a note appended to Professor Powell's paper, he alludes to the observations of the eclipse of October 9 of the present year, in which small beads were observed, with waving in the limb, but without increase, or elongations of the shadows into threads, or any other change. In the case of M. Schaub's observations, the complementary combination employed might, by the loss of light, have destroyed any effects of irradiation. Also, as the ring formed was very thin, the difference of the intensities of the sun's light for the breadth of the band would be very small; and thus the causes above referred to might not act to a perceptible extent: the whole of the phenomena might be simply accounted for, as M. Mauvais observes, by the mere consideration of the irregularities of the moon's limb as it just touched that of the sun.

Results deduced from the Occultations of Stars and Planets by the Moon. Observed at Cambridge Observatory from 1830 *to* 1835. By the Astronomer Royal.

These occultations were reduced at the time in the most complete manner which was then practicable. A very approximate place of the star having been assumed, the apparent place of the point of the moon's limb at which the occultation took place was known, and by the application of the proper correction for parallax, the geocentric place of the same point for the instant of occultation was also known. The geocentric place of the moon's centre was

computed for the instant of occultation, according to the Lunar Tables. From the spherical co-ordinates of these two points, their distance was computed, which ought to be equal to the tabular semidiameter of the moon. 'Any discordance must arise from some of the following sources,—an error in the assumed R.A. or N.P.D. of the star, an error in the tabular R.A. or N.P.D. of the moon, an error in her parallax or semidiameter, or in the time of observation. The effects of errors of all these kinds (except that of the moon's semidiameter), upon the computed distance between the moon's centre and the point on her limb, were calculated and expressed symbolically; and, finally, the computed distance, with the addition of these symbolical terms, was made absolutely equal to the tabular diameter, with the addition of a symbolical term: thus the final equation contains one numerical term derived from the observation, and seven symbolical terms. This is essentially the simplest and most complete result which can be derived from the observation of an occultation; and if the numerical values of any one of the symbols shall become known, such symbols may, by numerical substitution, be removed from the equation.

The equations, in the form just described, are published in the various volumes of the Cambridge Observations from 1830 to 1835.

The form can now be simplified for the following reasons:—

1st. The stars have been carefully determined, hence the symbols for their errors in R.A. and N.P.D. can be got rid of in all cases. The same may be said, with few exceptions, of the places of the occulted planets.

2nd. Mr. Henderson's investigation of the value of the Horizontal Parallax of the Moon (*Mem. Roy. Ast. Soc.*, vol. x.) enables us to remove the corresponding symbol.

3rd. An error had been committed in the computation of the symbolical factor respecting the correction to be made to the time of observation. The change in the place of the moon's centre had been correctly computed, but the change in the correction for parallax, consequent on a change in the hour angle depending on a correction for time, had been omitted. The equations are now cleared of this fault.

To facilitate the application of the results to Lunar theories, the form of the equations has been changed; and they now depend on errors of Longitude and Ecliptic North Polar Distance, and not on errors of R.A. and N.P.D.

It was not thought advisable to introduce into the equations the numerical correction of the moon's semidiameter, as deduced from transit and circle observations, as it would be hazardous to assume that this semidiameter is necessarily the same as the semidiameter of the opake body behind which the occultations occur.

To the year 1833 inclusive, the Lunar Elements are computed from the *Berliner Jahrbuch*: for 1834 and 1835, they are derived from the *Nautical Almanac*. The computations have been partly made by Mr. Glaisher, partly by Mr. H. Breen, jun.; and the

Astronomer Royal places great reliance on the accuracy of the results.

The Memoir is divided into Three Sections.

Sect. I. Places of the Occulted Stars adopted for computation.

Sect. II. Correction of the assumed value of Horizontal Parallax, and Correction of the Factor of the Error of Time, depending on the change of Parallax during the error of time.

Sect. III. Transformation of the final equations from the form depending on errors of the moon's place in R.A. and N.P.D. to a form depending on errors of the moon's place in Longitude and Ecliptic North Polar Distance: and exhibition of the final results.

Letter from the Rev. W. R. Dawes.

"On the first of last month, while tracing the southern limits of the great nebula in *Orion*, my attention was attracted by the appearance of the star which stands on the point of the *proboscis major*. With my $8\frac{1}{2}$-foot equatoreal, power 195, the star was distinctly separated into two, whose magnitudes were carefully estimated to be the eighth and ninth. I have since searched in vain for any notice of the duplicity of this star; yet it must have come under the eye of every observer who has scrutinised the ramifications of this most extraordinary of the nebulæ. In the map of the regions and stars of the nebulæ, presented by Sir John Herschel to the Astronomical Society in 1826, and contained in vol. ii. of the *Memoirs*, this star is inserted, and denominated *A*. The same designation is given to it in the catalogue of the stars in the nebula given by Sir John in page 28 of his *Results of Astronomical Observations made at the Cape*, in which it stands as No. 135. It is there called 6·7 magnitude, which is far brighter than it appears in *this* latitude: yet its identity is unquestionable. Though one of the most conspicuous stars in that part of the nebula, and inserted with perfect accuracy from micrometrical observations in the beautiful plate in Sir John's volume of *Results*, yet no intimation is given of its being double. Neither does it appear in the catalogue of Double Stars, observed with the 20-foot reflector. It seems scarcely probable that if, ten years ago, it presented its present appearance, it should not have been recognised under the power of the 20-foot reflector, and within 30° of the zenith. This would perhaps be more extraordinary than that it should have escaped detection by Mr. Cooper with his gigantic refractor, or by Dr. Lamont with the large telescope of $11\frac{1}{4}$ inches aperture at the Royal Observatory at Munich (whose observations of the nebula are specially referred to by Sir John Herschel), or by Struve at Dorpat, or finally by De Vico at Rome, who seems to have paid great attention to this